

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

Jeffery N. Gleason

Serial No.: 10/690,319

Filed: October 20, 2003

For: INTERMEDIATE
SEMICONDUCTOR DEVICE
STRUCTURE (as amended)

Confirmation No.: 1135

Examiner: H. Trinh

Group Art Unit: 2814

Attorney Docket No.: 2269-5157.1US
(01-1004.01/US)

VIA ELECTRONIC FILING

January 15, 2008

APPEAL BRIEF

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attn: Board of Patent Appeals and Interferences

Sirs:

This APPEAL BRIEF is being submitted in the format required by 37 C.F.R.

§ 41.37(c)(1). The fee required under 37 C.F.R. § 41.20(b)(2) for filing a brief in support of an appeal is enclosed. The fee required by 37 C.F.R. § 41.20(b)(2) for filing a Notice of Appeal was paid by Appellant on November 16, 2007.

I. REAL PARTY IN INTEREST

U.S. Application Serial No. 10/690,319 (hereinafter “the ‘319 Application”), the application at issue in the above-referenced appeal, has been assigned to Micron Technology, Inc., as evidenced by the assignment that has been recorded with the U.S. Patent & Trademark Office (hereinafter “the Office”) at Reel No. 012934, Frame No. 0557. Accordingly, Micron Technology, Inc., is the real party in interest in the above-referenced appeal.

II. RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Appellant or his representatives that are related to, will directly affect, be directly affected by, or otherwise have a bearing on the Board’s decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-8 are currently pending in the above-referenced patent application. Claims 1-8 stand rejected. Claims 9-18 were previously canceled without prejudice or disclaimer. No claims are allowed. The rejections of claims 1-8 are being appealed.

IV. STATUS OF AMENDMENTS

A Final Office Action (“Final Office Action”) was mailed by the Office on August 16, 2007. Appellant filed a response thereto on October 16, 2007, in which no claims were

amended. An Advisory Action (“Advisory Action”) was mailed on November 2, 2007. As such, all amendments to the claims and specification have been entered.

A Notice of Appeal and a Pre-Appeal Brief were filed on November 16, 2007.

A Notice of Panel Decision from Pre-Appeal Brief Review was mailed by the Office on December 13, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

In fulfillment of the provisions of 37 C.F.R. § 41.37(c)(1)(v), Appellant provides a summary of the claimed subject matter for each of the independent claims at issue. The present application currently recites one independent claim, specifically claim 1.

Claim 1 is directed to an intermediate structure of a semiconductor device that includes at least one exposed open fuse structure and a metal feature. (See the as-filed specification at at least p. 7, line 7 through p. 8, line 13; p. 8, line 23 through p. 9, line 2; p. 10, lines 1-13; and p. 11, lines 19-25). The at least one exposed open fuse structure is present on the intermediate structure of the semiconductor device. (*Id.*). The metal feature is present on an exposed metal structure of the intermediate structure of the semiconductor device (*Id.*). The metal of the metal feature is present on the exposed metal structure and is not present on the at least one exposed open fuse structure (*Id.*).

VI. GROUND S OF REJECTION TO BE REVIEWED ON APPEAL

(i) Whether claims 1 and 3-8 are unpatentable under 35 U.S.C. § 102(b) over U.S. Patent No. 3,699,395 to Boleky (hereinafter “Boleky”).

(ii) Whether claim 2 is unpatentable under 35 U.S.C. § 102(b) over Boleky or, in the alternative, under 35 U.S.C. § 103(a) over Boleky

VII. ARGUMENT

(i) Rejection under 35 U.S.C. § 102(b) over Boleky

STANDARD OF PATENTABILITY UNDER 35 U.S.C. § 102(b)

A claim is anticipated under 35 U.S.C. § 102(b) only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

In view of this standard and the arguments set forth below, Appellant respectfully submits that the claims are not anticipated under 35 U.S.C. § 102(b) by Boleky.

Claims 1 and 3-8

Claims 1 and 3-8 stand rejected under 35 U.S.C. § 102(b) as allegedly being unpatentable over Boleky.

Boleky discloses a semiconductor device that includes a substrate 12, diodes 16, strips of semiconductor material 18, strips of metal 32, and fuses 42. (Boleky at column 2, lines 11-42). The strips of semiconductor material 18 are formed from silicon. (*Id.* at column 2, lines 21-42 and column 6, lines 5-8). The fuses 42 connect the diodes 16 and the strips of metal 32. (*Id.* at column 2, lines 43-47). The strips of semiconductor material 18 are formed by depositing the

semiconductor material on the substrate 12 and masking and etching the semiconductor material. (*Id.* at column 2, lines 58-68). The strips of semiconductor material 18 are covered with insulating material 28, which is etched to expose portions of the strips of semiconductor material 18 through openings 46. (*Id.* at column 3, lines 4-15). The entire surface of the workpiece is coated with a metal layer 50, which is etched to form the strips of metal 32. (*Id.* at column 3, lines 16-31). Portions 52 of the metal layer 50 remaining in the openings 46 are separated from the strips of metal 32 by gaps 56. (*Id.* at column 3, lines 31-34). The entire surface of the workpiece is coated with a fuse material, which is masked and etched to form the fuses 42 that connect the strips of metal 32 and the portions 52 of the metal layer 50. (*Id.* at column 3, lines 35-43).

Boleky does not anticipate independent claim 1 because Boleky does not expressly or inherently describe the element recited therein of “a metal feature on an exposed metal structure of the intermediate structure of the semiconductor device.” The Examiner alleges that “an exposed metal structure” is present in FIG. 1 of Boleky as strip 18. (Final Office Action, page 2). However, Boleky discloses that strip 18 is “an elongated strip 18 of a semiconductor material...[comprising] N conductivity type silicon.” (Boleky at column 2, lines 21-22 (emphasis added)). Since strips of semiconductor material 18 of Boleky are formed from silicon, a semiconductive material, the strips of semiconductor material 18 are not “an exposed metal structure,” as recited in claim 1.

In addition, as described below, the Examiner has not provided convincing support for the assertion that silicon is a metal and that a person of ordinary skill in the art would consider silicon to be a metal.

United States Patent No. 6,008,124 to Sekiguchi et al. Does Not Stand for the Proposition that Silicon is a Metal

The Examiner asserts that “silicon in the art may be considered as a metal” and relies on column 17, lines 1-2 of United States Patent No. 6,008,124 to Sekiguchi *et al.* (“Sekiguchi”) in support of this assertion. (See the Final Office Action, p. 4 and the Advisory Action, p. 1). As an initial matter, Appellant notes that Sekiguchi has not been made of record in the above-mentioned case. The section of Sekiguchi relied upon by the Examiner states that “the effect of the present invention can be expected as long as formation conditions capable of forming a barrier compound layer of a compound of nitrogen, oxygen, metal such as titanium and silicon, are used.” (Sekiguchi at column 16, line 66 through column 7, line 2 (emphasis added)). The Examiner alleges that the phrase “metal such as titanium and silicon” provides support for the assertion that silicon is a metal. As best understood, the Examiner’s interpretation of this phrase appears to be that titanium and silicon are two examples of metals. However, as explained below, when Sekiguchi is viewed in its entirety, it is evident that the Examiner’s interpretation is inconsistent with other portions of Sekiguchi.

In addition to the relied-upon section of Sekiguchi, Sekiguchi describes the barrier compound layer more than twenty times. In each of these instances, the barrier compound layer is disclosed as being composed of a compound of four elements: nitrogen, oxygen, a metal, and silicon. Specifically, Sekiguchi discloses that the barrier compound layer is “composed of a compound of nitrogen, oxygen, metal and silicon,” “composed of a compound of nitrogen, oxygen, titanium and silicon,” “composed of a nitrogen-oxide-metal-silicon compound,” “composed of a nitrogen-oxygen-first metal-silicon compound,” “composed of a nitrogen-

oxygen-titanium-silicon compound,” “composed of a nitrogen-oxygen-cobalt-silicon compound,” “composed of a N-O-Ti-Si compound,” and “composed of a N-O-Co-Si compound.” (See Sekiguchi at the Abstract; column 8, lines 26, 27, 61, and 62; column 9, lines 13 and 14; column 10, lines 24, 25, 30, and 31; column 11, lines 6, 7, 57, and 58; column 12, lines 19 and 34; column 13, line 18; column 14, lines 21, 46, and 47; column 15, lines 29 and 30; column 16, lines 14 and 15; column 17, lines 38, 39, 43, 44, 49, 50, 54, and 55; column 18, lines 9, 10, 16, and 17; and claim 1).

Based on these descriptions, it is clear that the barrier compound layer of Sekiguchi is composed of a compound of nitrogen, oxygen, a metal (*i.e.*, titanium or cobalt), and silicon. Therefore, the Examiner’s reliance on the phrase “metal such as titanium and silicon” in support of the assertion that silicon is a metal is erroneous. Rather, this phrase describes that a metal (*i.e.*, titanium) and silicon are two of the four elements of the compound used as the barrier layer compound. Appellant respectfully submits that Sekiguchi’s use of the term “such as” in the above-mentioned phrase does not indicate that silicon is a metal. Rather, “such as” indicates that titanium is used as the metal because alternative metals, such as cobalt, are also disclosed in Sekiguchi. Therefore, the Examiner’s reliance on Sekiguchi is misplaced because Sekiguchi does not disclose that silicon is a metal.

A Person of Ordinary Skill in the Semiconductor Industry Would Not Define Silicon as a Metal

As evidenced by the five dictionary definitions of the term “silicon” provided by Appellant in a Supplemental Information Disclosure Statement filed on October 16, 2007, silicon is a non-metallic element. As such, a person of ordinary skill in the art would understand that

silicon is not a metal. The definitions from the five, different dictionaries directly contradict the Examiner's position that silicon is a metal.

The classification of "silicon" as a metal, as asserted by the Examiner, is not only inconsistent with the ordinary and customary meaning of the term, but is also inconsistent with case law. A U.S. District Court was faced with a similar issue where an applicant allegedly classified silicon as a metal. *Lemelson Medical, Education & Research Foundation LP v. Intel Corp.*, 61 USPQ2d 1905 (D. Ariz. 2002). In addressing the possibility that a patentee may have defined silicon as a metal, the court stated that:

However, the court cannot ignore the fact that Mr. Lemelson identified silicon as a "metal", which it is not, in the specification. This reference cannot be written off as an attorney's mistake during prosecution because it is in the specification itself. On the other hand, Mr. Lemelson also identified silicon as a "*semi-conducting*" film in the specification. At best, this makes the specification ambiguous. In the end, it is not clear what category the specification put silicon in. Nor is it clear what category Mr. Lemelson would have put silicon in, although it strikes the court as highly improbable that Mr. Lemelson would have deliberately placed silicon, one of the best-known and most common semi-conductors, in the conducting metal or metal category.

(*Id.* at 1912 (italicized emphasis in original, underlined emphasis added)). The court in Lemelson addressed the possibility of Lemelson having classified silicon as a metal due to the ambiguous language in the Lemelson specification. However, even after consideration of the ambiguity, the court concluded that it is highly improbable that Lemelson would have deliberately classified silicon as a metal.

While it is well-established that "an applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning," in the absence of such special definitions, silicon ought to be defined according to its ordinary and customary meaning. (MPEP § 2106(II)(C)). However, in the

instant case, neither the '319 Application nor Boleky define silicon as a metal or in an ambiguous manner.

The Examiner's assertion that a person of ordinary skill in the art may consider silicon to be a metal is also directly contradictory to the primary reference (Boleky) used in the instant §102(b) rejection. In the Final Office Action, the Examiner states that "an artisan in the art considers the layer 18 of Boleky to be metal material." (Final Office Action, p. 4). However, Boleky discloses that "[e]ach diode 16 is an integral portion of an elongated strip 18 of a semiconductor material." (See *Boleky*, col. 2, lines 21-22 (emphasis added)). A person of ordinary skill in the semiconductor industry would recognize that materials are typically classified into three categories: conductors, non-conductors, and semiconductors. Furthermore, it is well known in the art that metals are conductors. It would be unreasonable for a person of ordinary skill in the art to consider layer 18 in Boleky to be a metal or conductor since Boleky explicitly discloses that layer 18 is a semiconductive material. In addition, the Examiner's assertion that layer 18 of Boleky would be considered a metal is inconsistent with Boleky's description of layer 18 as a semiconductive material because silicon can not be classified as both a conductor/metal and a semiconductor.

Since the Examiner's statement that silicon is a metal is inconsistent with the art relied upon by the Examiner, the case law, and the ordinary and customary meaning of the term "silicon," there is no support for the Examiner to classify silicon as a metal. Rather, the Examiner appears to base the anticipation rejection on a mischaracterization of silicon as a metal. In so doing, the Examiner overlooks the ordinary and customary meaning of the term "silicon"

and the inconsistency of the Examiner's asserted meaning with other portions of Sekiguchi and Boleky. As such, Appellant asserts that such classification is erroneous.

Since Boleky does not describe, either expressly or inherently, each and every element of claim 1, Appellant respectfully requests that the Board reverse the 35 U.S.C. § 102(b) rejection of claim 1.

Dependent claims 3 through 8 are allowable, *inter alia*, as depending from claim 1.

(ii) Rejection under 35 U.S.C. § 102(b) over Boleky or, in the alternative, under 35 U.S.C. § 103(a) over Boleky

Claim 2

Dependent claim 2 stands rejected under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a) as assertedly being unpatentable over Boleky.

The nonobviousness of independent claim 1 precludes a rejection of claim 2, which depends therefrom, because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), *see also* MPEP § 2143.03.

Therefore, Appellant requests that withdrawal of the 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) rejections of dependent claim 2.

VIII. CLAIMS APPENDIX

A copy of claims 1-8 is appended hereto as "Appendix A."

IX. EVIDENCE APPENDIX

No evidence has been submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132 during prosecution of the above-referenced patent application. Accordingly, no evidence appendix accompanies this Appeal Brief.

As required by 37 C.F.R. § 41.37(c)(1)(ix), the only “other evidence entered by the examiner and relied upon by appellant in the appeal” includes references cited in forms PTO-1449. These references include the dictionary definitions of “silicon,” which were cited in form PTO-1449 submitted on October 16, 2007, and made of record by the Examiner on October 26, 2007. Since copies of these references are present in the record, no EVIDENCE APPENDIX is required and additional copies of these documents are not provided with this Appeal Brief.

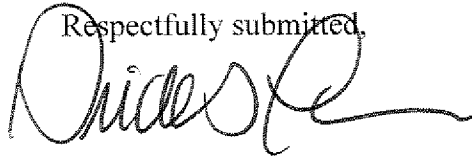
X. RELATED PROCEEDINGS APPENDIX

No decisions have been rendered by the Board or any court in a related application. Therefore, a related proceedings appendix does not accompany this Appeal Brief.

XI. CONCLUSION

The rejections of claims 1-8 should be reversed, and each of these claims should be allowed.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Brick G. Power", written over the typed name.

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APPENDIX A

Claims 1-8

U.S. Patent Application No. 10/690,319

Filed October 20, 2003

1. An intermediate structure of a semiconductor device comprising:
at least one exposed open fuse structure on the intermediate structure of the semiconductor device; and
a metal feature on an exposed metal structure of the intermediate structure of the semiconductor device, wherein a metal of the metal feature is present on the exposed metal structure and is not present on the at least one exposed open fuse structure.
2. The intermediate structure of claim 1, wherein the metal feature comprises an electrolessly plated metal feature.
3. The intermediate structure of claim 1, wherein the metal feature is a metal layer, an interconnect cap, a redistribution layer, or a bond pad.
4. The intermediate structure of claim 1, wherein the metal feature is a metal layer.
5. The intermediate structure of claim 1, wherein the metal feature comprises a nickel, palladium, gold, tin, silver, or copper feature.
6. The intermediate structure of claim 1, wherein the metal feature comprises a nickel feature.
7. The intermediate structure of claim 1, wherein the exposed metal structure comprises at least one bond pad.

8. The intermediate structure of claim 1, wherein the intermediate structure is an intermediate structure of an SRAM or FLASH memory chip.

Claims 9-18 (Canceled)